REPUBLIC OF THE PHILIPPINES

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PNS/PAES 157 (2011) (English): Agricultural machinery - Power Sprayer for Mango - Specifications

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PHILIPPINE NATIONAL STANDARD

PNS/PAES 157:2011
(PAES published 2011)
ICS 65.060.01

Agricultural machinery – Power Sprayer for Mango – Specifications

BUREAU OF PRODUCT STANDARDS

DEPARTMENT OF TRADE & INDUSTRY PHILIPPINES

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National Foreword

This Philippine Agricultural Engineering Standards PAES 157:2011, Agricultural machinery – Power Sprayer for Mango – Specifications was approved for adoption as Philippine National Standard by the Bureau of Product Standards upon the recommendation of the Agricultural Machinery Testing and Evaluation Center (AMTEC) and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development of the Department of Science and Technology (PCARRD-DOST).

Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Development of Standards for Agricultural Production and Postharvest Machinery" funded by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development - Department of Science and Technology (PCARRD - DOST).

This standard has been technically prepared in accordance with BPS Directives Part 3:2003 – Rules for the Structure and Drafting of International Standards.

The word "shall" is used to indicate mandatory requirements to conform to the standard.

The word "should" is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In the preparation of this standard, the following documents/publications were considered:

DARE.2009. Agricultural mechanization and energy management. DARE/ICAR Annual Report 2008–2009.

Resende, J.V. and V. Silveira Jr. 2004. Air velocity profiles in air blast freezers filled with boxes of fruit pulp models. Engenharia Térmica (Thermal Engineering), Vol. 3 · No. 2 · December 2004 · p. 127-133.

Sumner, P.E. 2005. Pecan orchard air blast sprayers. Department of Agricultural and Biological Engineering. The University of Georgia.

United States Patent US3774845. Orchard Sprayer.

United States Patent USD422056. Hose End Trigger Power Spray Nozzle.

1 Scope

This standard specifies the manufacturing and performance requirements for a power sprayer for mango.

2 References

The following normative documents contain provisions, which, through the reference in this text, constitute provisions of this National Standard:

AWS D1.1:2000 Structural Welding Code – Steel

PAES 102: 2000 Agricultural Machinery – Operator's Manual – Content and Presentation

PAES 158:2011 Agricultural Machinery – Power Sprayer for Mango – Methods of Test

3 Definitions

For the purpose of this standard, the following definitions shall apply:

3.1
cut-off valve
valve used to stop the flow of fluid (Fig.1)

3.2
lance
metallic tube that connects the nozzle to the hose of power sprayer (Fig. 1)

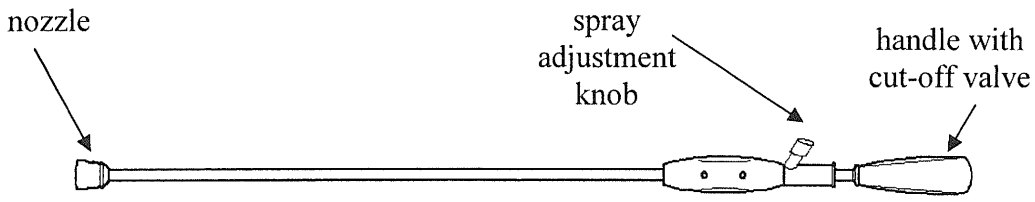

Figure 1. Lance

3.3
power sprayer for mango
equipment powered by an electric motor or by an engine used to spray fertilizer or pesticide to a certain height (Fig.2 and 3)

3.4
nozzle
tip of lance of the power sprayer where the chemical is sprayed out (Fig.1)

3.5
pressure relief valve
component of the power sprayer used to regulate the pressure

3.6
runoff
overflow of water from the nozzle

4 Classification

4.1 Frame mounted power sprayer

Type of power sprayer mounted on a steel frame which is carried by at least two (2) operators for transport (Fig. 2).

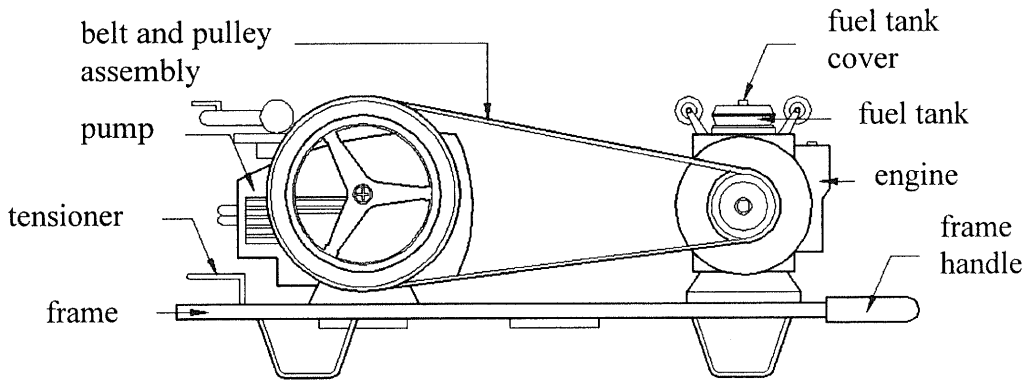

Figure 2. Frame mounted power sprayer

4.2 Wheel-mounted power sprayer

Type of power sprayer mounted on wheels, either pushed by an operator or towed by a vehicle. The pump can be powered by an engine or an electric motor (Fig. 3).

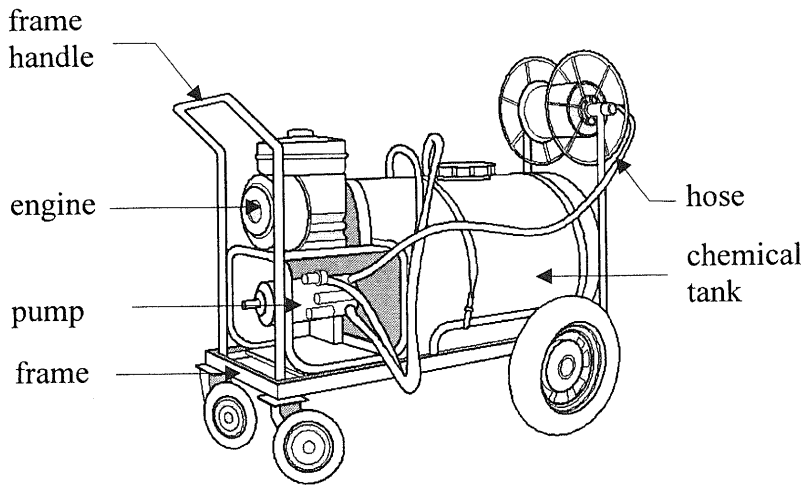

Figure 3a. Hand-pushed wheel-mounted power sprayer

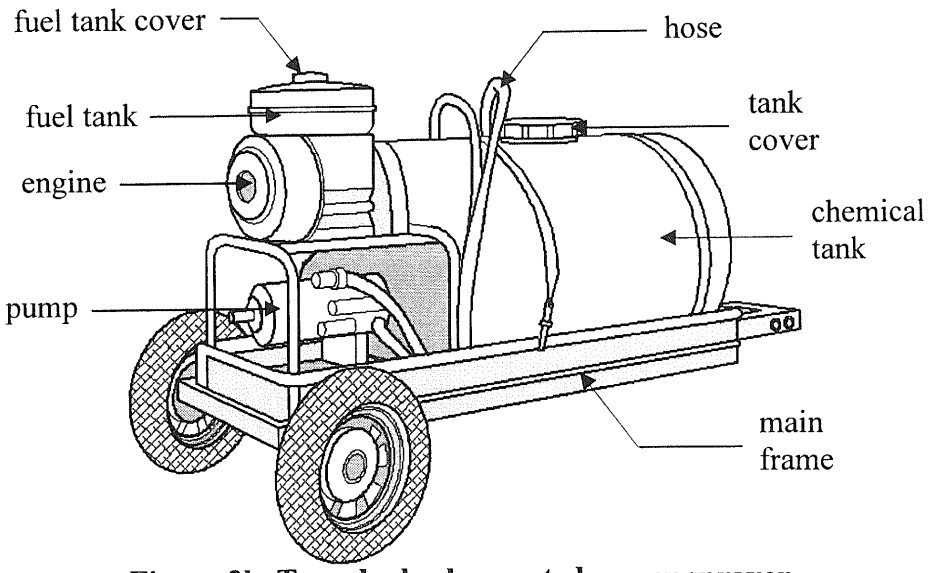

Figure 3b. Towed wheel-mounted power sprayer

5 Principle of Operation

Before starting the pump, the intake hose shall be dipped into the tank filled with the solution. The pressure relief valve shall be opened and shall be set to the desired pressure. The cut-off valve shall be opened and shall be adjusted to achieve the desired spray. The nozzle shall be preset to stream or mist prior to application. Streams shall be directed above the tree while mists shall be directed on the leaves or flowers of the tree. After spraying, the cut-off and pressure relief valves shall be closed before turning off the pump.

6 Manufacturing Requirements

Generally, the power sprayer shall consist of main frame, prime mover (engine or electric motor), pump, spray hose, lance and nozzle. All specifications indicated below are minimum requirements.

6.1.1 The main frame shall be made of mild steel (e.g. AISI 1020) or better material with a thickness of at least 6 mm. It shall be constructed from welded angular or flat bars.

6.1.2 The prime mover shall be mounted on the main frame with hexagonal bolts with at least 10 mm (3/8") diameter. Lock nuts shall be used to secure the prime mover to the frame.

6.1.3 The pump shall be mounted on the main frame with hexagonal bolts with at least 10 mm (3/8") diameter. Lock nuts shall be used.

6.1.4 The pump shall be of a positive displacement type and shall have a return line integrated in the system.

6.1.5 The spray hose shall be made of chemical resistant polyvinylchloride or better material with an inside diameter of at least 10 mm (3/8"). It shall have a minimum length of 15 m and a maximum length of 200 m.

6.1.6 The lance shall be made of non-corrosive steel or better material. It shall have a length of at least 1 m.

6.1.7 The nozzle shall be made of non-corrosive material and shall be detachable from the lance to allow replacement.

6.1.8 The nozzle shall be adjustable to produce mist or stream.

6.1.9 Pressure relief valves shall be installed to regulate pressure of the pump.

6.1.10 Cut-off valve shall be installed on the handle of the lance to allow instant stopping of the spray.

6.1.11 Pressure gauge shall have an accuracy of ± 1% of maximum pressure.

6.1.12 Hose clamps shall be made of non-corrosive material.

6.1.13 Frame handle shall be covered with a non-slip and non-corrosive material.

6.1.14 The power sprayer shall have a minimum of two filters, which are made of non-corrosive material, with each allowing easy cleaning, maintenance and/or replacement

6.1.15 The filter shall have a mesh of 100 per square centimeter.

6.1.16 All welded parts shall be in accordance with the criteria set in AWS D1.1:2000.

6.1.16.1 There shall be no crack on welded area.

6.1.16.2 There shall be fusion between adjacent layers of weld metal and base metal.

6.1.16.3 All craters shall be filled to provide the specified weld size, except for the end of intermittent fillet welds outside of their effective length.

6.1.16.4 Welded joints shall not be less than 4 mm size fillet weld.

6.1.16.5 Undercut shall not exceed 2 mm for any length of weld.

6.1.17 Frame mounted power sprayer

6.1.17.1 The intake hose shall be made of chemical resistant polyvinylchloride or better material with an inside diameter of at least 16 mm. It shall have a filter at the end to prevent possible contaminants from clogging the pump line.

6.1.17.2 The material of the hose may be either rubber or synthetic material. If rubber, it shall have one or more plies of fiber reinforcement.

6.1.17.3 Hoses shall be retained on connectors and couplings preferably by clamps or clips of the worm drive type. Threaded connections may be of any design provided the strength and size permit liquid tight joints to be made by thumb pressure at the highest operating pressure of the sprayer.

6.1.17.4 The power sprayer shall be equipped with belt tensioner.

6.1.18 Wheel mounted power sprayer

6.1.18.1 The tank shall be made of chemical resistant polyvinylchloride or better material with a thickness of at least 6 mm (1/4"). It shall have a water-tight condition.

6.1.18.2 The tank cover shall be made of chemical resistant polyvinylchloride or better material.

6.1.18.3 Gaskets shall be made of chemical resistant polyvinylchloride or better material.

6.1.18.4 There shall be a ground clearance of at least 200 mm.

6.1.18.5 The power sprayer shall have a minimum of two filters, which are made of non-corrosive material, with each allowing easy cleaning, maintenance and/or replacement.

6.1.18.6 The filter shall have a mesh of 100 per square centimeter.

7 Performance Requirements

7.1 The power sprayer shall not produce noise higher than 92 db measured one meter away from the source of noise.

7.2 The power sprayer shall produce uniformly-sized droplets.

7.3 The power sprayer shall have an operating pressure of 1.21 MPa (175 psi) to 1.75 MPa (250 psi).

7.4 The power sprayer shall have a discharge rate of at least 15 Lpm.

8 Safety, Workmanship and Finish

8.1 The chemical tank of the power sprayer shall have rounded corners.

8.2 Safety locks shall be provided to avoid accidental opening of the valve.

8.3 Mufflers shall have protective cover to protect the operator from burns.

8.4 Belt and pulley assembly shall have protective cover.

8.5 All bolts and nuts shall conform with standards for strength application and shall be made of hot-galvanized steel for corrosion resistance.

9 Warranty of Performance

9.1 Warranty shall be provided for parts and services within six (6) months after installation and acceptance by the consumer.

9.2 Warranty shall be provided for the prime mover within one (1) year after installation and acceptance by the consumer.

10 Maintenance and Operation

10.1 An operator's manual preferably conforming to PAES 102:2000 shall be provided.

10.2 Drain valve on chemical tank shall be provided for wheel-mounted power sprayer.

11 Testing

The power sprayer shall be tested for performance in accordance with PAES 158:2011.

12 Marking and Labeling

12.1 The power sprayer shall be marked in English with the following information:

12.1.1 Brand name or Registered trademark of the manufacturer (optional)

12.1.2 Model and/or Serial number

12.1.3 Country of manufacture (if imported)/"Made in the Philippines" (if manufactured in the Philippines)

12.1.4 Basic specifications of the power sprayer

12.2 Safety/precautionary markings shall be provided. Markings shall be stated in English and shall be printed in red color with a white background.

12.3 The markings shall have a durable bond with the base surface material and shall be water and heat resistant under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.

Philippine Agricultural Engineering Standards

AMTEC-UPLB – PCARRD Project: "Development of Standards for Agricultural Production and Postharvest Machinery"

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